Octupole magnet for soft x ray magnetic dichroism experiments: design and performance

E. Arenholz, Advanced Light Source, Lawrence Berkeley National Laboratory, USA and S.O. Prestemon, Engineering Division, Lawrence Berkeley National Laboratory, USA.

We present the newly developed vector magnetometry endstation that has been installed at the magnetic spectroscopy and microscopy beamline 4.0.2 at the ALS. The endstation consists of an octupole magnet that surrounds a small vacuum chamber (see design sketch below). The magnet provides magnetic fields up to 0.9 T that can be applied in any direction relative to the incoming x-ray beam. In combination with the variable polarization capabilities of the undulator beamline - left and right circular as well as linear horizontal to vertical polarization are available for photon energies between 80 and 2000 eV - the new system provides a unique facility for magnetic materials research using magnetic dichoism in the soft x-ray range.

High precision magnetic circular and linear dichoism spectra can be obtained switching magnetic field or light polarization for each photon energy in an energy scan. Moreover, the field dependence of all components of the magnetization vector can be studied in detail using magnetic circular dichoism by choosing different angles of incidence for the x-ray beam while keeping the relative orientation of magnetic field and sample fixed.

Details on the system design as well as first experimental results will be presented.

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